

Northern Illinois College of Optometry

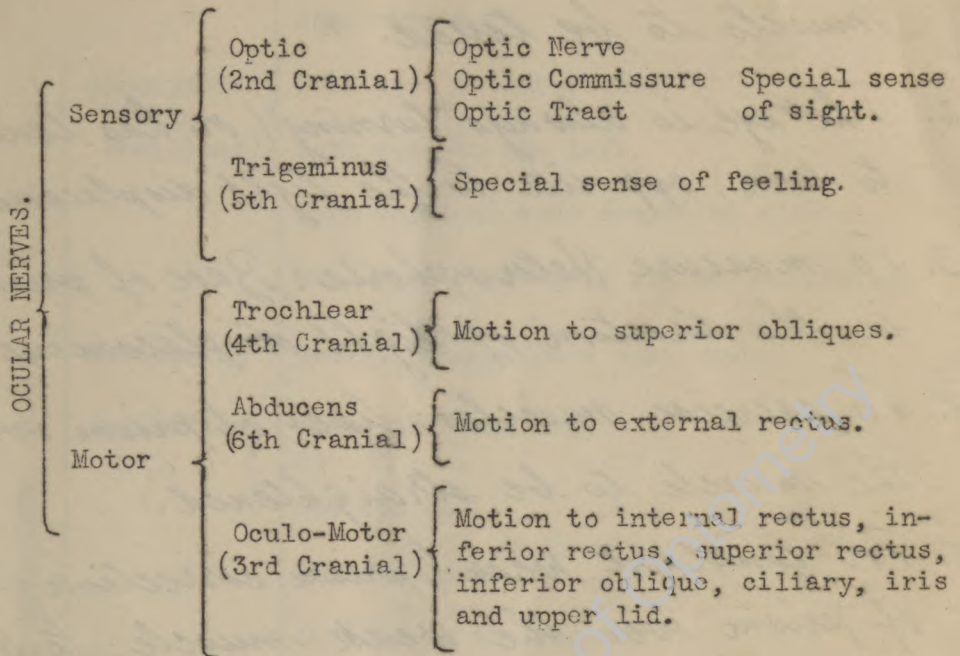
Muscles of the Eye

Study Outlines

RE731
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General rules for Muscle work.

1. To test ductions: apex of prism over the muscle to be tested.
2. The eye is always turning (or has tendency to turn) opposite to the light displacement.
3. To measure Heterophoria: Base of prism in the direction of light displacement.
4. To exercise muscles: Apex of prism over the muscle to be straightened.
5. For constant wear (prism correction) base of prism over the weak muscle; to rest it.

EYE MOVEMENTS.

<i>produce single binocular vision</i>		Both eyes up.
		Both eyes down.
{	Homonymous (Like Positions)	Both eyes to the right.
		Both eyes to the left.
		Both vertical axes deviating alike.
		Both eyes converging and accommodating.
	Derivation	{ Greek: homonymous = same name.
	Definition	{ Under the same law.
{	Heteronymous (Unlike Positions)	One eye up.
		One eye down.
		One eye to the right.
		One eye to the left.
		One vertical axis deviating.
		Both eyes out.
		Both eyes in without accommodating.
	Derivation	{ Greek: heteronymous = other name.
	Definition	{ Under different laws.

Both eyes up, with accommodation of lens.
 Both eyes down.
 Both eyes to the right.
 Both eyes to the left.
 Both vertical axes deviating alike.
 Both eyes converging and accommodating.

Homononymous
 (Linn)
 Positions

Derivation { Greek: homonymus = same name.
 Definition { Under the same law.
 One eye up.
 One eye down.
 One eye to the right.

Derivation
 Definition

One eye to the left.
 One vertical axis deviating.
 Both eyes up.
 Both eyes in different accommodations.

Heteronymous
 (Linn)
 Positions

Derivation { Greek: heteronymus = other name.
 Definition { Under different laws.

Derivation
 Definition

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DUCTIONS.	ADDUCTION	Derivation	{ Latin: ad = towards + ducere = to lead.
		Definition	{ The power of the <u>internal muscles</u> to turn the eyes inward with <u>accommodation at rest</u> .
		Other name	{ Relative convergence.
		Test	{ Rule { Apex of the prism over the muscle to be tested. Application { Apex in; base out.
		Amount	{ From 6 to 26 P.D. <u>Normal average 24 P.D.</u>
	ABDUCTION	Derivation	{ Latin: ab = away + ducere = to lead.
		Other name	{ Negative convergence. (<i>divergence</i>)
		Definition	{ The power of the <u>external muscles</u> to turn the eyes outward.
		Test	{ Rule { Apex of the prism over the muscle to be tested. Application { Apex out; base in.
		Amount	{ From 4 to 9 P.D. <u>Normal average 8 P.D.</u>
	SUPRADUCTION	Derivation	{ Latin: supra = above + ducere = to lead.
		Definition	{ The power of the superior rectus to turn the eye up.
		Other names	{ sursumduction: superduction.
		Varieties	{ Right and left.
	INFRADUCTION	Test	{ Rule { Apex of the prism over the muscle to be tested. Application { Apex up; base down.
		Amount	{ From 1 to 5 P.D. <u>Normal average 2 P.D.</u>
		Derivation	{ Latin: infra = beneath + ducere = to lead.
		Definition	{ The power of the inferior rectus to turn the eye down.
		Other names	{ Desursumduction: subduction.
		Varieties	{ Right and left.
		Test	{ Rule { Apex of the prism over the muscle to be tested. Application { Apex down; base up.
		Amount	{ From 1 to 3 P.D. <u>Normal average 2 P.D.</u>

COLLECTION		COLLECTION		COLLECTION		COLLECTION	
Amount	From 1 to 3 P.D. Normal average 2 P.D.	Test	Application (Apex down; base up) Rule (Apex of the prism over the muscle to be tested.)	Varieties	Right and left. Other names: (transposition; subversion.)	Definition	The power of the inferior rectus to turn the eye down.
Derivation	Latin: infra + beneath + dorsum = to lead.	Amount	From 1 to 3 P.D. Normal average 2 P.D.	Test	Application (Apex up; base down). Rule (Apex of the prism over the muscle to be tested.)	Varieties	Right and left. Other names: (transposition; subversion.)
Definition	The power of the superior rectus to turn the eye up.	Derivation	Latin: super + above + dorsum = to lead.	Amount	From 4 to 8 P.D. Normal average 6 P.D.	Test	Application (Apex out; base in). Rule (Apex of the prism over the muscle to be tested.)
Other names	(negative convergence.)	Derivation	Latin: ab + away + dorsum = to lead.	Amount	From 6 to 26 P.D. Normal average 24 P.D.	Test	Application (Apex in; base out). Rule (Apex of the prism over the muscle to be tested.)
Other names	(Relative convergence.)	Definition	The power of the external muscles to turn the eyes outward.	Amount	From 6 to 26 P.D. Normal average 24 P.D.	Test	Application (Apex in; base out). Rule (Apex of the prism over the muscle to be tested.)
Definition	The power of the internal muscles to turn the eyes inward with accommodation at rest.	Derivation	Latin: ad + towards + dorsum = to lead.	Amount	From 6 to 26 P.D. Normal average 24 P.D.	Test	Application (Apex in; base out). Rule (Apex of the prism over the muscle to be tested.)

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TESTING DUCTIONS.

General
procedure
for testing
all of the
ductions.

1. { Place the ametropic correction before the eyes.
2. { Have the patient seated at a distance of 6 meters from a small light.
3. { Place a weak prism before the eye apex over the muscle to be tested.
4. { Increase the power of the prism gradually until the patient reports diplopia.
5. { The strongest prism which the patient can fuse measures the duction.

Important
modification
in testing
adduction

1. { Put on ametropic correction.
2. { Place the light at the side of an illuminated test card.
3. { With every increase of prism ask the patient to read the test letters.
4. { The strongest prism which he can fuse, maintaining distinct vision measures the adduction.

letters will blur.

Orthophoria depends on -

1. Anatomic balance : muscles are exactly correct in length and in attachment, and the macula properly located in each retina.
2. Equalize tonus : exactly equal in all ocular muscles when the eyes are fixed at infinity.

Definition of false image : An image formed by refraction thru an ophthalmic prism.

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Derivation { Greek: orthos = normal + phoros = tending.

Definition { Perfect binocular balance.

*Convergence
measures up to
30°*

ORTHOPIHORIA.

Test
to prove
Orthophoria

1. { Light at a distance of 6 meters.
2. { Cover the right eye with the blank disc.
3. { Back of it put the red glass.
4. { Place the double prism in a horizontal position before the left eye.
5. { The patient will see two white lights with a faint streak connecting them.
6. { By rotating the double prism, adjust the lights to a vertical position.
7. { Remove the blank disc, telling the patient that he should see a third light, which is red.
8. { If the three lights lie on the same vertical line there is no lateral *phoria* imbalance.
9. { Cover the right eye with the blank disc.
10. { Turn the double prism at right angles to its former position.
11. { By rotating the double prism, adjust the lights to a horizontal position.
12. { Remove the blank disc, telling the patient that he should see a third light, which is red. *in center*
13. { If the three lights lie on the same horizontal line there is no vertical imbalance.

Deduction { Since the test shows neither lateral nor vertical imbalance, it proves orthophoria.

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HETEROPHORIA.

Derivation { Greek: heteros = other + phoros = tendency.

Meaning { Other than normal tendency.

Definition { Imperfect binocular balance.

Usual
Varieties

Esophoria: a tendency of the visual axes to deviate inward.

Exophoria: a tendency of the visual axes to deviate outward.

Hyperphoria: a tendency of one eye to deviate above its mate.

Cataphoria: a tendency of ^{both eyes to} ~~one eye to de-~~ viate ~~below its mate.~~ *turn down*

Hyperesophoria: a tendency of the visual axis of one eye to deviate upward and inward.

Hyperexophoria: a tendency of the visual axis of one eye to deviate upward and outward.

General Rule for Testing { In measuring heterophorias put the base of the prism in the direction of light displacement.

TEST FOR ESOPHORIA.

Procedure

1. { Light at a distance of 6 m.
2. { Cover the right eye with the blank disc.
3. { Back of it put the red glass.
4. { Place the double prism in a horizontal position before the left eye.
5. { The patient will see two white lights.
6. { By rotating the double prism adjust the lights to a vertical position.
7. { Remove the blank disc, telling the patient that he should see a third light, which is red.
8. { The patient will see the red light displaced to the right.

Rule

{ The eye is deviating opposite to the direction in which the light appears displaced.

Proof

{ The right eye is turning inward.

Measurement

1. { Place weak prisms base out over either eye, increasing their strength until the three lights lie in the same vertical plane.
2. { The prism required to bring the three lights in the same vertical plane measures the amount of the esophoria.

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1. Put on ammetropic correction
2. Prism exercise
3. Prism correction

Procedure

Rule

Proof

Measurement

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TREATMENT FOR ESOPHORIA.

I.
Indirect
Treatment

1. { Don't treat unless esophoria exceeds 5 P.D. or is associated with myopia.
2. { Correct the ametropia.
3. { Eye calisthenics. *do not use prism*

Scope { We must strengthen the external muscles. That means we must develop abduction.

Rule { Apex over the muscle to be strengthened.

Application { Base in.

II.
Prism
Exercise

1. { Small light at 6 meters.
2. { Place weak prisms, base in, over either eye increasing their strength until diplopia results.

3. { Have the patient close his eyes.
4. { Remove the prism.
5. { Repeat the entire process.

6. { Develop abduction until about 8 P.D. base in, can be fused.

1. { Once a day.
2. { Just after meals.
3. { The exercise should last 5 to 10 minutes.

III.
Correction
with Prism

Rule { For constant wear, when exercise fails, place the base of the prism over the weak muscle to rest it.

Application { Base out.

Amount { As a rule prescribe only $\frac{2}{3}$ of the full amount found in the test, placing half over each eye.

I. Indirect Treatment

1. Don't treat unless oculars are in S. S. or is associated with myopia.
2. Correct the myopia.
3. Eye exercises.

II. Direct Treatment

1. Give the patient the external treatment. That means we must do the eye exercises.
2. Give the patient the internal treatment. That means we must do the eye exercises.
3. Give the patient the external treatment. That means we must do the eye exercises.
4. Give the patient the internal treatment. That means we must do the eye exercises.
5. Give the patient the external treatment. That means we must do the eye exercises.
6. Give the patient the internal treatment. That means we must do the eye exercises.
7. Give the patient the external treatment. That means we must do the eye exercises.
8. Give the patient the internal treatment. That means we must do the eye exercises.
9. Give the patient the external treatment. That means we must do the eye exercises.
10. Give the patient the internal treatment. That means we must do the eye exercises.

III. Correction with Prism

1. As a rule prescribe the 1/2 of the full amount found in the test, placing half over the eye.
2. As a rule prescribe the 1/2 of the full amount found in the test, placing half over the eye.
3. As a rule prescribe the 1/2 of the full amount found in the test, placing half over the eye.

TEST FOR EXOPHORIA.

Procedure

1. { Light at a distance of 6 meters.
2. { Cover the right eye with the blank disc.
3. { Put the red glass back of it.
4. { Place the double prism in a horizontal position before the left eye.
5. { The patient will see two lights.
6. { By rotating the double prism adjust the lights to a vertical position.
7. { Remove the blank disc, telling the patient that he should see a third light which is red.
8. { The patient will see the red light displaced to the left.

Proof

{ The right eye is turning outward.

Measure-
ment

{ Place weak prisms, base in, over either eye, increasing their strength until the three lights lie in the same vertical plane.

{ The prism required to bring the three lights in the same vertical plane, measures the amount of the exophoria.

1. Light at a distance of 5 meters.
2. Cover the right eye with the blank disc.
3. Put the red glass back of it.
4. Place the double prism in a horizontal position before the left eye.
5. The patient will see two lights.
6. By rotating the double prism adjust the lights to a vertical position.
7. Remove the blank disc, telling the patient that he should see a third light which is placed to the left.
8. The patient will see the red light disc placed to the left.
9. The patient is looking forward.
10. Place work at eye level, over right eye, instilling with anesthetic until the third light is the same vertical plane.
11. The patient is to observe the three lights in the same vertical plane, under the same conditions.

Procedure

Procedure

Procedure

Procedure

Procedure

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I
Indirect
Treatment

1. { Don't treat unless exophoria exceeds 3 P.D. or is associated with hyperopia.
2. { Correct ametropia.
3. { Eye calisthenics.

Scope { We must strengthen the interni muscles without altering accom-
modation; that means we must
develop adduction.

Rule { Apex over the muscle to be
strengthened.

Application { Base out.

II
Prism
Exercise

- Procedure {
1. { Small light at a distance of 6 meters by the side of an illuminated test chart.
 2. { Place weak prisms, base out, over either eye, increasing their power until diplopia results.
 3. { Have the patient close his eyes.
 4. { Remove the prism.
 5. { Repeat the entire process.
 6. { Develop adduction until about 24 P.D. base out can be fused with accommodation at rest.
 7. { If the letters of the test chart become blurred at any time during the exercise, remove the prism and start again with weak prisms.
- }

- Time {
1. { Once a day.
 2. { Just after meals.
 3. { The exercise should last about 5 to 10 minutes.
- }

III
Correction
with Prism

Rule { For constant wear, when exer-
cise fails, place the base of
the prism over the weak muscle
to rest it.

Application { Base in.

Amount { As a rule prescribe only $\frac{2}{3}$
of the full amount found in
the test, placing half over
each eye.

1. Don't treat unless symptoms are present
2. D.D. or is associated with symptoms
3. Correct anisometropia
4. Use orthotics

I
Indicated
Treatment

We must strengthen the internal
muscles with the following exercises:
neck; then make the same
exercise adjustment.
Look over the muscle to be
strengthened.
Look at the base of the

George
Sally
Application

Small light at a distance
of 6 inches by the side of
an illuminated test chart.
Place weak prism, base up,
over right eye. Indicate
smaller words with diplopia
vergence.

Then the patient closes the
eyes.
Remove the prism.
Repeat the entire process.
Develop a fixation point
about 12 D. base out and
be fixed with accommodation
at rest.

It is the purpose of the test
chart become blurred at any
time during the exercise
remove the prism and repeat
again with weak prism.

Look at a sign
Look at the words.
The exercise should last
about 10 minutes.

For constant wear, when exercise
has failed, place the base of
the prism over weak muscle
at rest.

Application: Wear in
as a rule prescribe only 1/2
of the full amount found
in test, placing half over
each eye.

Sally
Application
Amount

III
Correction
with Prism

ALFRED W. HARRIS

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TEST FOR RIGHT HYPERPHORIA.

Procedure

1. { Light at a distance of 6 meters.
2. { Cover the right eye with the blank disc.
3. { Back of it put the red glass.
4. { Place the double prism in a vertical position before the left eye.
5. { The patient will see two white lights.
6. { By rotating the double prism, adjust the lights to a horizontal position.
7. { Remove the blank disc, telling the patient that he should see a third light, which is red.
8. { The patient will see the red light displaced down.

Proof

{ The right eye is turning up.

Measurement

1. { Place weak prisms base down over the right eye, increasing the strength until the three lights lie in the same horizontal plane.
2. { The prism required to bring the three lights in the same horizontal plane measures the amount of the right hyperphoria.

Ortho (normal) Anatomic balance { Equal balance
Equalized tonus

Homo = (same)
phoria { Ana = up
Cata = down
Dextra = right
Sinistra = left

Hetero =
phoria
(different)

Eso = in
Exo = out
Cyclo

Hyper =

{ + in at bottom
- out at bottom

{ Right
Left

Phoria.

(Tendency.)

Treatment
of
Phorias. { Indirect { Correct refractive error
Constitutional
Direct { Physical Culture
Prism Exercise
Prism Correction

TREATMENT FOR RIGHT HYPERPHORIA.

I.
Indirect
Treatment

1. {Don't treat unless hyperphoria exceeds $1/2$ P.D.
2. {Correct the ametropia.
3. {Eye calisthenics.

II.
Prism
Exercise

- Scope {We must strengthen the inferior rectus of the right eye and the superior rectus of the left eye.
- Rule {Apex over the muscle to be strengthened.
- Application {Base up over the right eye or base down over the left eye.
 1. {Small light at 6 meters.
 - {Place weak prisms base up over the right eye or base down over the left eye, increasing their strength until diplopia results.
 2. {Have the patient close his eyes.
 3. {Remove the prism.
 4. {Repeat the entire process.
 5. {Develop infraduction or ^{RE.}supraduction until about 3 P.D. can be fused.
- Time
 1. {Once a day.
 2. {Just after meals.
 3. {The exercise should last from 3 to 5 minutes.

III.
Correction
with Prism

- Rule {For constant wear, when exercise fails place the base of the prism over the weak muscle to rest it.
- Application {Base down over the right eye or base up over the left eye.
- Amount {As a rule, prescribe only $2/3$ of the full amount found in the test, placing half over each eye.

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Esophoria.

{ with the rule
against the rule

{ With hyperopia
(all cases under
5 D need no treat-
ment)
With myopia:
(Treat all cases.)

Exophoria.

{ with the rule
against the rule

{ With myopia
(all cases under
3 P.D. need no treat-
ment)
With hyperopia
(Treat all cases)

Esophoria under
5 P.D. with the rule

Exophoria under 3 P.D.

{ Esophoria usually corrects
itself if hyperopia is cor-
rected in full.
Exophoria usually corrects
itself if myopia is corrected

Esophoria with
myopia - against
the rule.
Exophoria with
Hyperopia.

{ Test
all
cases

{ Prism exercises
Oculo-Didactes
(Calisthenics)

TEST FOR LEFT HYPERPHORIA.

- | | | | |
|-------------|---|---|---|
| Procedure | { | 1. | { Light at a distance of 6 meters. |
| | | 2. | { Cover right eye with the blank disc. |
| | | 3. | { Back of it put the red glass. |
| | | 4. | { Place the double prism in a vertical position before the left eye. |
| | | 5. | { The patient will see two white lights. |
| | | 6. | { By rotating the double prism, adjust the lights to a horizontal position. |
| | | 7. | { Remove the blank disc, telling the patient that he should see a third light, which is red. |
| | | 8. | { The patient will see the red light displaced up. |
| Proof | { | The right eye is turning down, or the left eye is turning up. | |
| Measurement | { | 1. | { Place weak prism base up over the right eye, increasing their strength until the three lights lie in same horizontal plane. |
| | | 2. | { The prism required to bring the three lights in the same horizontal plane, measures the amount of the left hyperphoria. |

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Spasm of the inferior oblique muscle,
or weakness of superior oblique muscle
causes plus cyclophoria.

Weakness of the inferior oblique muscle
or spasm of superior oblique muscle
causes minus cyclophoria.

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TREATMENT FOR LEFT HYPERPHORIA.

I.
Indirect
Treatment

1. { Don't treat unless hyperphoria exceeds $1\frac{1}{2}$ P.D.
2. { Correct the ametropia.
3. { Eye calisthenics.

II.
Prism
Exercise

Scope

{ We must strengthen the inferior rectus of the left eye and the superior rectus of the right eye.

Rule

{ Apex over the muscle to be strengthened.

Procedure

1. { Small light at 6 meters.
{ Place weak prisms base down over the right eye or base up over the left eye, increasing their strength until diplopia results.
2. {
3. { Have the patient close his eyes.
4. { Remove the prism.
5. { Repeat the entire process.
6. { Develop inf^{of L.E.}raction or sup^{R.E.}raction until about 3 P.D. can be fused.

Time

1. { Once a day.
2. { Just after meals.
3. { The exercise should last from 3 to 5 minutes.

III.
Correction
with Prism

Rule

{ For constant wear, when exercise fails, place base of prism over the weak muscle to rest it.

Application

{ Base up over the right eye or down over the left.

Amount

{ As a rule prescribe only $\frac{2}{3}$ of the full amount found in the test, placing half over each eye.

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1. Patient's head placed against the support. 2. The patient is instructed to close the eyes. 3. The patient is instructed to relax the muscles.	Indirect Treatment	I.
The most important part of the treatment is the relaxation of the eye muscles. This is achieved by the patient closing the eyes and relaxing the muscles. The patient is instructed to relax the muscles of the eye and the surrounding muscles.	Indirect Treatment	I.
1. Small right at 5 minutes. 2. Place with patient's head over the right eye or nose. 3. Up over the left eye, the crossing their strength up.	Indirect Treatment	I.
4. Have the patient close the eyes. 5. Remove the prism. 6. Repeat the entire process.	Indirect Treatment	I.
7. Dilation of the right eye. 8. Application of the right eye. 9. The eye can be fixed.	Indirect Treatment	I.
1. Close a day. 2. Just after work. 3. The exercises should last from 5 to 10 minutes.	Indirect Treatment	I.
For constant wear, when using the eye, place the eye over the work muscle as it is used.	Indirect Treatment	I.
1. Place over the right eye. 2. Place over the left eye.	Indirect Treatment	I.
As a rule, the patient should be instructed to relax the muscles of the eye and the surrounding muscles. This is achieved by the patient closing the eyes and relaxing the muscles. The patient is instructed to relax the muscles of the eye and the surrounding muscles.	Indirect Treatment	I.

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TESTING LATERAL IMBALANCE AT THE READING DISTANCE.

Procedure

1. {The Fixation object should be a small dot on a plain card at a distance of about 13 inches.
2. {Cover the right eye with the blank disc.
3. {Place the double prism in a horizontal position before the left eye.
4. {The patient will see two dots.
5. {By rotating the double prism, adjust the dots to a vertical position.
6. {Remove the blank disc, telling the patient that he should see a third dot.
7. {If the three dots are on the same vertical line orthophoria at the reading distance is indicated.

How may the middle dot appear?

Two Cases

- A. {The patient sees (with the right eye) the middle dot displaced to the right.
- B. {The patient sees (with the right eye) the middle dot displaced to the left.

Proof

Case A.

{The right eye is turning in and this condition is called esophoria at the near point. Indicates weak accommodation.

Case B.

{The right eye is turning out and this condition is called exophoria at the near point. Indicates abundant accommodation.

Measurement

Case A.

{Place a weak prism base out over either eye, increasing the strength until the three dots lie on the same vertical line. The prism required to bring the three dots on the same vertical line measures the amount of the esophoria at the reading distance.

Case B.

{Place a weak prism base in over either eye, increasing the strength until the three dots lie on the same vertical line. The prism required to bring the three dots on the same vertical line measures the amount of the exophoria at the reading distance.

<p>1. The fixation object should be a small dot on a plain card at a distance of about 12 inches.</p> <p>2. Cover the right eye with the black disc.</p> <p>3. Place the double prism in a horizontal position before the left eye.</p> <p>4. The patient will see two dots.</p> <p>5. By rotating the double prism, adjust the dots to a vertical position.</p> <p>6. Remove the black disc, telling the patient that he should see a third dot.</p> <p>7. If the three dots are on the same vertical line orthoporia at the reading distance is indicated.</p>	<p>Procedure</p>	<p>How may the middle dot be placed?</p>	<p>Two Cases</p>	<p>Case A.</p> <p>The right eye is turning in and this condition is called esophoria at the near point. Indicated weak accommodation.</p> <p>Case B.</p> <p>The right eye is turning out and this condition is called exophoria at the near point. Indicated abundant accommodation.</p>	<p>Measurement</p>	<p>Case A.</p> <p>Place a weak prism base in over either eye, increasing the strength until the three dots lie on the same vertical line. The prism required to bring the three dots on the same vertical line measures the amount of the esophoria at the reading distance.</p> <p>Case B.</p> <p>Place a weak prism base in over either eye, decreasing the strength until the three dots lie on the same vertical line. The prism required to bring the three dots on the same vertical line measures the amount of the exophoria at the reading distance.</p>
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CYCLOPHORIA.

Derivation	{ Greek: kuklos = circle + phoreo = I bear.
Definition	{ A tendency of one or both eyes to rotate on the optic axes.
Test	<div><div><div>1. { The fixation object should be a short line drawn on a card and placed before the patient at a distance of about 13 inches, with the line in a horizontal position.</div><div>2. { Cover the right eye with the blank disc.</div><div>3. { Place the double prism in a horizontal position before the left eye.</div><div>4. { The patient will see two lines.</div><div>5. { By rotating the double prism, adjust the lines to a horizontal position.</div><div>6. { Remove the blank disc.</div><div>7. { The patient should see a third line between the first two.</div><div>8. { If the lines are not parallel, cyclophoria is indicated.</div><div>9. { If the middle line inclines upward to the right it indicates that the vertical axes of the eyes incline toward each other at the bottom.</div><div>10. { If the middle line inclines upward to the left it indicates that the vertical axes incline toward each other at the top.</div></div></div>
Treatment	{ This condition cannot be corrected by lenses or prisms. Constitutional treatment is the only possible measure.
Constitutional Treatment	<div><div>1. All the rest possible.</div><div>2. Eye calisthenics. <i>without prism</i></div><div>3. From 9 to 10 hours sleep a day.</div><div>4. Good nerve building diet.</div><div>5. Fresh air and sunshine.</div></div>

Catatropia: An actual deviation of both eyes downward.

Cyclotropia: An actual deviation of the lower part of the vertical meridian

- 1.) Inward (+ cyclotropia)
- 2.) Outward (- cyclotropia)

10.	top, incline toward each other at the bottom.	
9.	the right is indicated that the vertical axis of the eyes incline toward each other at the bottom.	
8.	It the middle line inclines upward to the right it indicates that the vertical axis of the eyes incline toward each other at the bottom.	
7.	If the lines are not parallel, cyclotropia is indicated.	
6.	The patient should see a third line between the first two.	
5.	Remove the blank disc.	
4.	By rotating the double prism, adjust the lines to a horizontal position.	
3.	The patient will see two lines.	
2.	Place the double prism in a horizontal position before the left eye.	
1.	Cover the right eye with the blank disc.	
Treatment		
5.	5. Fresh air and sunshine.	
4.	4. Good nerve building diet.	
3.	3. From 2 to 10 hours a day.	
2.	2. Eye exercises.	
1.	1. All the rest possible.	
This condition cannot be corrected by lenses or prism. Constitutional treatment is the only possible remedy.		

STRABISMUS.

Derivation { Greek: strabos = oblique.

Meaning { Turn aside: crooked.

Definition { A condition in which the visual axis of one eye is deviated from the point of fixation.

Synonyms { Heterotropia. *technical term*
Cross-eyes.
Squint.

Convergent { (Esotropia) one eye or both deviate inward.

Divergent { (Exotropia) one eye or both deviate outward.

Vertical { (Hypertropia) one eye deviates upward.

Varieties { Concomitant { The squinting eye has freedom of movement and will follow the other.
opp. Paralytic

Paralytic { Opposite condition from concomitant.

both eyes may turn
Alternating { The eyes take turns in fixing and squinting.

Monolateral { Constant or one sided.

Periodic { Intermittent: the squint manifests itself only occasionally.

happens during drunkenness, one sees double due to alcohol acting on nerve center in brain.

Distortion { Great: strabismus = oblique.
Less: the condition in which the image is distorted.

Strabismus { Two kinds: convergent and divergent.

Definition { A condition in which the visual axis of one eye is deviated from the point of fixation.

Synonyms { Heterotropia, Strabismus, Squint, Cross-eyes, Wandering eyes.

Convergent { (Esotropia) one eye or both deviate inward.

Divergent { (Exotropia) one eye or both deviate outward.

Vertical { (Heterotropia) one eye deviates upward or downward.

Varieties { The squinting eye has freedom of movement and will follow the other.

Paralytic { Opposite condition from the constant.

Intermittent { The eyes take turns in fixating and squinting.

Monocular { Deviated on one side.

Bilateral { Deviated on both sides.

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LENS TREATMENT FOR CONVERGENT SQUINT.

1. { Cover the turning eye with the blank disc.
2. { Record the vision of the good eye.
3. { By means of a plus lens fog the eye so that the
largest letter on the chart appears blurred.
4. { Transfer the blank disc to the good eye.
5. { The turning eye will now be directed toward the
letter chart, unless the externus is paralyzed.
6. { Record the vision of the poor eye.
7. { By means of a plus lens fog the eye so that the
largest letter on the test chart appears blurred.
8. { By means of minus lenses unfog until the patient
can distinguish the letters in the 60 foot line.
9. { Substitute a single lens for the combination of
plus and minus.
10. { On removing the blank disc the better eye should
continue turning in and the poor eye fixing. If
not, use eye patch over better eye.
11. { Fit the glasses in temporary frame, using large
lenses.
12. { Order eye calisthenics.
13. { The eyes may straighten within a week, may require
several months or may never straighten without
prism method.

1. Cover the cornea with the black glass.
2. Record the vision of the good eye.
3. By means of a plus lens for the eye so that the largest letter on the chart appears blurred.
4. Transfer the black glass to the good eye.
5. The turning eye will now be allowed to read the next chart, unless the extreme is required.
6. Record the vision of the poor eye.
7. By means of a plus lens for the eye so that the largest letter on the chart appears blurred.
8. By means of minus lenses until the patient can distinguish the letters in the 50 foot line.
9. Substitute a single lens for the combination of plus lenses.
10. On removing the black glass the patient should compare the far and the near eye vision. If not, use the near over better eye.
11. Fit the glasses in temporary frame, using large lenses.
12. Order eye examination.
13. The eyes may strabismic with a weak, eye require several months or may never stabilize without prism method.

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LENS TREATMENT WHEN EYE THAT CONVERGES
IS TOTALLY AMBLYOPIC.

1. { Cover the amblyopic eye with the blank disc.
2. { Record the vision of the good eye.
3. { By means of plus lenses fog the eye so that the largest letter on the chart will be blurred.
4. { By means of minus lenses unfog until the patient can distinguish the letters in the 60° foot line.
5. { Substitute a single lens for the combination of plus and minus.
6. { The same lens may be given to the other eye.
7. { Prescribe these glasses for treatment.
8. { These glasses, by relaxing the ciliary spasm, may cause the amblyopic eye to straighten.

LENS TREATMENT FOR
ALTERNATING SQUINT.

1. { When the eyes have equal vision fog both eyes equally to 20-60.
2. { Prescribe these glasses for treatment.
3. { Order eye calisthenics.
4. { The eyes may straighten in a week, may require months or may never straighten without prism method.

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1. Cover the anisotropic eye with the blank disc.
2. Record the vision of the good eye.
3. By means of prism lenses put the eye so that the largest letter on the chart will be in the blind spot.
4. By means of minus lenses until the patient can distinguish the letters in the blind spot.
5. Substitute a single lens for the combination of plus and minus.
6. The same lens may be given to the other eye.
7. Prescribe these glasses for treatment.
8. These glasses, by relaxing the ciliary muscles, may cause the anisotropic eye to straighten.
9. When the eyes have equal vision for both eyes equally to 20/80.
10. Prescribe these glasses for treatment.
11. Order two collimating lenses of 20 D.
12. The eyes may straighten in 2 or 3 days.

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Principles

1. { In his effort to ignore the false image
1. { the patient has lost all desire for single binocular vision.
2. { For this reason treatment glasses were unsuccessful.
3. { By means of prisms we must make single binocular vision possible.
4. { The prism, placed base out, must be of sufficient strength to displace light to the macula.
5. { After producing single binocular vision, it is possible to exercise the weak muscles.

Procedure

1. { Small light at a distance of 6 meters.
2. { Place prism base out, which produces single binocular vision.
3. { Neutralize this prism slowly by means of weak prisms base in over either eye, increasing their strength until diplopia results.
4. { Have the patient close his eyes.
5. { Remove the prism which you used base in. Repeat the entire process.
6. { Eventually the patient should be able to fuse the lights without the assistance of any prism.
7. { Continue the exercise with weak prisms base in increasing the strength until the patient can fuse from 6 to 8 P.D.
8. { The muscles will now be in perfect balance and cross eyes permanently corrected.
9. { Treatment glasses previously described should be worn between visits.

1. In this test the patient is asked to read the letters on the chart and to indicate which letter is missing.
2. The patient is then asked to read the letters on the chart and to indicate which letter is missing.
3. For this reason treatment glasses were prescribed.
4. Treatment of prism was not made.
5. Binocular vision possible.
6. The prism, placed base out, was not sufficient strength to relieve the strain.
7. After prescribing single binocular vision, it is possible to exercise the weak eye.
8. Small light at a distance of 6 meters.
9. Place prism base out, which produces single binocular vision.
10. Neutralize this prism slowly by means of weak prism base in over the eye, increasing their strength until the prism is neutral.
11. Have the patient close his eyes.
12. Remove the prism which you need base in, and the entire process.
13. Eventually the patient should be able to read the letters without the prism.
14. Continue the exercise with weak prism base in increasing the strength until the patient can read from 6 to 8 ft.
15. The exercise will now be in perfect balance and cross eyes permanently corrected.
16. Treatment glasses previously described should be worn between visits.

Principles

Procedure

WITH EXPLANATIONS FOR EACH STEP

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Exotropia.

difficult cases.

PRISM EXERCISE FOR DIVERGENT STRABISMUS.

Principles

1. { Fogging lenses must not be used in cases of divergent squint.
2. { By means of prisms we must make binocular vision possible.
3. { The prism base in must be of sufficient strength to displace the light to the macula.
4. { After producing single binocular vision it is possible to exercise the weak muscle.

Procedure

1. { Small light at a distance of 6 meters.
2. { Place the prism base in which produces single binocular vision.
3. { Neutralize this prism slowly by means of weak prisms base out over either eye, increasing strength until diplopia results.
4. { Have the patient close his eyes.
5. { Remove the prism which you used base out.
6. { Repeat the entire process.
7. { Eventually the patient should be able to fuse the lights without the assistance of any prism.
8. { Continue the exercise with weak prisms base out, increasing their strength until the patient can fuse from 20 to 30 P.D.
9. { The muscles will now be in perfect balance and the cross eyes permanently corrected.
10. { Wear ametropic correction between visits and after completion.

1. { Testing lenses must not be used in cases of divergent eyes.
2. { By means of prism we must make binocular vision possible.
3. { After procuring single binocular vision it is possible to determine the work done.
4. { Small light of a distance of 5 meters.
5. { Place the prism base in which produces single binocular vision.
6. { Increase the prism slowly by means of weak prism base cut over other eye.
7. { Increase strength until diplopia ceases.
8. { Have the patient close his eyes.
9. { Repeat the entire process.
10. { Usually the patient should be able to read the light without the aid of any prism.
11. { Continue to exercise with weak prism base out, increasing until strength is lost.
12. { The muscles will now be in perfect balance and the cross eyes permanently corrected.
13. { Near stereoscopic correction between vision and after correction.

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Prism exercise is of very little benefit in cases of vertical squint, but in some cases we can prescribe prisms for constant wear which will produce single binocular vision.

Test the vision of the eyes and find the ametropic correction.

Suppose the right eye is turning up.

Find the prisms which, when placed base down over the right eye and up over the left will produce single binocular vision.

Should the strength of these prisms be 10 P.D. or less each they may be prescribed for constant wear.

If their strength exceeds this amount do not prescribe them.

The ametropic correction may be given, but the strabismus should not be corrected with prism.

If the left eye is turning up the prisms must be placed base down over the left eye and base up over the right eye.

amblyopia is not due to any active ocular diseases, nor refractive error.

Retinal elements atrophy, die out slowly.

LEIGH CORRECTION FOR AMBLYOPIA

Prism correction is of very little benefit in cases of
vertical squint, but in some cases we can prescribe
prisms for constant wear which will produce single
binocular vision.

Test the vision of the eyes and find the anisometropic
correction.

Suppose the right eye is turning up.

Find the prism which, when placed base down over the
right eye and up over the left will produce single
binocular vision.

Should the strength of these prisms be 10 N.D. or less
and they may be prescribed for constant wear.

If their strength exceeds this amount do not prescribe
them.

The anisotropic correction may be given, but the
strabismus should not be corrected with prism.

If the left eye is turning up the prisms must be
placed base down over the left eye and base up over
the right eye.

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very important.

STRABISMUS WHICH IT IS USELESS TO
ATTEMPT TO STRAIGHTEN.

1. { Paralytic strabismus.
2. { Divergent strabismus with amblyopia.
3. { Vertical strabismus with amblyopia.
4. { Convergent strabismus with amblyopia after 8
 { years of age.
5. { Any congenital strabismus after 30 years of age.
6. { Any strabismus under 3 years of age.
7. { Any strabismus having been previous operated.

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TABLE I. CLASSIFICATION OF THE VARIOUS
TYPES OF STRABISMUS

CLASSIFICATION OF STRABISMUS	
1. {	Convergent strabismus
2. {	Divergent strabismus
3. {	Vertical strabismus
4. {	Convergent strabismus with amblyopia
5. {	Divergent strabismus with amblyopia
6. {	Vertical strabismus with amblyopia
7. {	Any strabismus under 5 years of age
8. {	Any strabismus between 5 and 10 years of age
9. {	Any strabismus over 10 years of age

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APPENDIX.

FACTS OF CHIEF IMPORTANCE TO ONE WHO SEEKS TO
PRACTICE MUSCLE WORK INTELLIGENTLY.

- First: Oculetics, or ocular gymnastics, are beneficial to all eyes, regardless of their state of balance, and if employed intelligently will contribute greatly toward the maintenance of efficient, comfortable vision.
- Second: In any case of imbalance "with the rule" the ametropia should be corrected in full and oculetics employed for all muscles alike.
- Third: In a case of imbalance "against the rule" the ametropia should have a slight undercorrection for a time, while oculetics are employed, stressing particularly an exercise of the ductions of the weaker muscles.
- Fourth: Abnormal imbalance at near, not revealed at infinity, may be benefited by general oculetics, together with attention to general health and possibly special correction at the reading distance.
- Fifth: Vertical imbalance and all cases of exophoria which do not respond to treatment, should be corrected with prism lenses.
- Sixth: All cases where *suspended vision for an instant (psychological)* ~~suspenopia~~ is suspected and most cases of abnormal imbalance at the near point, should have stereoscopic training.
- Seventh: As our final and most important rule, we would say: Beware of radicalism. In the words of Pope: "Be not the first by whom the new are tried, nor yet the last to lay the old aside."

APPENDIX

FACTS OF GREAT IMPORTANCE TO ONE WHO SEES TO
PRACTICE MUSCLE WORK INTELLIGENTLY.

- First: Confusion, or similar gymnastics, are beneficial to all eyes, regardless of their state of health, and if employed intelligently will contribute greatly toward the maintenance of efficient, comfortable vision.
- Second: In any case of imbalance "with the rule" the exercises should be corrected in full and confusion employed for all muscles alike.
- Third: In a case of imbalance "against the rule" the exercises should have a slight undercorrection for a time, while confusion are employed, stressing particularly an exercise of the du-
tion of the weaker muscles.
- Fourth: Abnormal imbalance at near, not revealed at infinity, may be benefited by general confusion, together with attention to general health and possibly special correction at the reading dis-
tance.
- Fifth: Vertical imbalance and all cases of exophoria which do not respond to treatment, should be corrected with prism lenses.
- Sixth: All cases where exophoria is suspected and most cases of abnormal imbalance at the near point, should have stereoscopic training.
- Seventh: As our final and most important rule, we would say: Beware of radicalism. In the words of Pope: "Be not the first by whom the new are tried, nor yet the last to lay the old aside."



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